FIRSTMATH – BRAZIL

Washington DC, June 10th, 2011

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BRAZIL

- Total area of 8.5 million km²
- 190 million people
- 8th largest economy (GDP)
- 3rd worst Gini Coefficient
- 73rd HDI
Brief Historical Overview

- 1985: Redemocratization after the end of military rule;

- 1988: Federal Constitution was promulgated:
  - Concerned about ensuring social rights;
  - High level of decentralization of public policy execution, specially in health, education and welfare areas;
  - Very complex system where States, Federal District and Municipalities have autonomy;
  - All three levels of government are expected to work in a collaborative way in many areas.
Brief Historical Overview

  - Regulates Brazilian education based on the Federal Constitution;
  - More pedagogical and administrative autonomy to schools;
  - Compulsory and free elementary education (7 to 14 years old);
  - Minimum percentage of Federal Government, States and Municipalities budgets to be spent on education;
  - Teacher education should be at teacher preparation courses in higher education institutions, but for early childhood education and elementary teachers is accepted a diploma of secondary level (ISCED 3) teacher preparation courses (Normal courses).
Brazilian Educational System

Brazil: a Federative Republic

- Federal Government:
  - Coordinates national policy, redistributes financial resources, establishes directions, conducts evaluations;
- 27 State-level systems, including the Federal district and 5,564 Municipal-level systems with autonomy to:
  - Create and execute state or municipal-level policies and manages local system (personal, infrastructure, pedagogical and other questions).
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<th>Duration</th>
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Students and Teachers

**Basic Education**

| ISCED 0 | 6,762,631 |
| ISCED 1 | 17,295,618 |
| ISCED 2 | 14,409,910 |
| ISCED 3 | 8,337,160 |
| **TOTAL** | **46,805,319** |

| ISCED 0 | 369,698 |
| ISCED 1 | 721,513 |
| ISCED 2 | 783,194 |
| ISCED 3 | 461,542 |
| **TOTAL** | **2,335,947** |

These are the “Regular Education” numbers. There are also: Special Education, Education for Young People and Adults and Professional Education.

Source: INEP/MEC
Lack of Attractivity of Teacher Career

- Low relative wages (40% less than other similar occupations);
- Hard working conditions: few time out of classroom for planning and organizing classes, lack of supervisor support, lack of students respect and collaboration, etc;
- Low social status profession with low recognition;
- It’s not seen like a profession that requires high specialization;

So:

- The best – not even the average – student don’t go to teacher training schools;
- There’s a teacher shortage in some subject as physics, chemystry, mathematics.
Who wants to be a teacher in Brazil?

Chances to choose to become a teacher according to the score on a high school exam (ENEM) in 2007

- Less than 20 pts: 8.75%
- 20 – 40 pts: 8.30%
- 40 – 60 pts: 6.96%
- 60 – 80 pts: 5.28%
- More than 80 pts: 3.43%
Ways to Become a Basic Education Teacher in Brazil

### Step 1 - Becoming Licensed To Teach

<table>
<thead>
<tr>
<th>ISCED 0 - 1</th>
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</table>
| • Normal/Magistério (Secondary Education)*  
| • Pedagogy (Higher Education) |

<table>
<thead>
<tr>
<th>ISCED 2 - 3</th>
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</table>
| • Specific area of teacher education, like Math - Licenciatura (Higher Education)  
| • Bachelor in a specific area and add subjects on teacher education |

### Step 2 - Being Recruited and Selected to Teach

<table>
<thead>
<tr>
<th>ISCED 0 to 3</th>
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</table>
| • Participate in a State or Municipal selection in order to get a contract:  
  • Simplified selective process: temporary contracts  
  • Or Complete selective process (Concurso Público): permanent contracts  
| • Or being directly hired by a private school |
Ways to Become a Basic Education Teacher in Brazil

Step 3 - Being Allocated to a School in a State or Municipal System

- Once selected by a State or Municipal system, a teacher must be allocated to a specific school.
- Usually the novice with the best scores get to choose where to teach. When a job position opens in a school, usually teachers with more years of teaching get priority in choosing to transfer to this school.

Step 4 – Being Approved After a Probation Period

- In order to get a permanent contract, teachers must be evaluated through a probation period of 3 years;
- In fact, most evaluations only verify formal aspects like absence and punctuality, and don’t actually give an idea of its teaching performance.
Pedagogy Undergraduate Course

A generalist to acts professionally in ISCED 0 and ISCED 1.

Regular curriculum: educational theories and foundations, policies, laws, school management, specific subject pedagogy, education modalities.

Usually there are no math content classes and only one math pedagogy class in the whole undergraduate course. To improve knowledge on math pedagogy, people often seek for graduate courses or in service education.

Students must complete 300 to 600 hours of internship, but most of this are done by only watching classes and lectures, not actually acting as a teacher, under supervision.
Mathematics Undergraduate Course

Acts professionally in ISCED 2 and ISCED 3.

It is supposed to teach only math, but sometimes it also teaches physics, for example.

Two modalities: bachelor and “licenciatura” (teacher education). It’s possible to have a common base with a final option or to have a whole “licenciatura” course.

Lot of classes on mathematics content, some classes on educational subjects and some classes on mathematics pedagogy.

Students must also complete an internship, but most of this are done by only watching classes and lectures, not actually acting as a teacher, under supervision.
Institutional Program of Scholarship to a Internship as Teacher (PIBID)

- Scholarships to presential course students that are initiating to teach as public schools interns;

- Aims: to anticipate the contact of the future teachers with classroom environment in public schools and also to stimulate the students to take teaching careers specially concerning subjects with more demand for professionals as biology, maths, physics and chemistry;

- Higher education institutions can present project proposals for their students in a partnership with state or municipal public education establishments concerning the participation of their students in the schools activities;

- Since 2008 and only for students of public universities.
Getting a Permanent Teacher Position

- Selections of public servants must be done by public exams – usually written exams – and diplomas;
- For example, for elementary school teachers, some research showed that written exams:
  - focus on contents related to educational Law and educational systems structure;
  - include Portuguese language exams but no other area of knowledge is taken into account;
  - rarely includes questions related to the pedagogical work.
National Teacher Exam for Public Selections

- In order to improve the public selections is being developed a national exam coordinated by INEP to help States and Municipalities to better select their teachers;
- First, it will be offered to select early childhood education teachers and elementary teachers (ISCED 0 and 1);
- The tests’ table of specifications is being finished;
- It will assess teachers competencies on applying content knowledge, planning, evaluating, applying strategies to teach, understanding his role as a teacher, including all the students in learning, and other things;
- We hope to start a discussion about standards from this initiative.
National Plan of Teachers Education (PARFOR)

- Goal: to offer undergraduate courses to public school teachers without the desired education according to Brazilian law;
- In all the areas of knowledge, presentational education and distant learning available:
  - First undergraduate course (teachers education) for teachers without a “licenciatura” degree;
  - Second undergraduate course (teachers education) for teachers that already hold a “licenciatura” degree but in a different area;
  - Courses of pedagogical education for teachers that already hold a degree in the area but not a specific teacher education;
THE ROLE OF TEACHER UNIONS

- Teachers from each state system often have their own union and some municipalities also have their own union;
- Most of these unions are affiliated to the National Confederation of Educational Workers (CNTE);
- The major role of CNTE and unions is related to labor issues;
- Sometimes they also make effort to influence other kinds of issues like educational rights.
THE ROLE OF TEACHER SOCIETIES
(Brazilian Society of Mathematics Education)

- Influence in the National Standards (PCN, 1998);
- Evaluation of text-books given by the government to students of public schools;
- National and regional conferences for teachers in Mathematics Education;
- A periodic publication with articles on the teaching and learning of Mathematics;
- Research meetings with the publication of books from each thematic group;
- Creation of regional societies of Mathematics Education.
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<table>
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<td>Content knowledge and skills to be developed by the students in each grade</td>
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<th>School Pedagogical Project</th>
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<td>From a global analysis of the school environment to more specific information</td>
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</table>
National Evaluation System for Basic Education (SAEB) and Prova Brasil

- Assessments of the nation's students attending the last year of ISCED 1, ISCED 2 and ISCED 3 (SAEB – sample of public and private schools / Prova Brasil – all public primary and lower secondary schools);
- Main subject areas assessed: Portuguese (Reading) and Mathematics;
- Based on the “PCNs” and on a sample of regional curricula at the time of SAEB development;
- Questionnaires (contextual background): students, teachers, and principals.
Literacy Assessment of Children (Provinha Brasil)

- It targets all students who attend the second year of primary education (ISCED 1) in public schools;
- The main skills assessed are related to the appropriation power of the alphabetic system of writing and literacy;
- A math version is being developed;
- The federal government makes a free distribution of the test and material support of assessment for all public schools that offer the second year in a primary;
- It aims at the development of a diagnosis in the beginning of the school year and measures the accomplishment in the end focusing on the literacy process of children starting primary school.
Basic Educational Development Index (IDEB)

\[ \text{IDEB} = \frac{\text{Students Score} \times \text{Flow Rates}}{\text{SAEB /Prova Brasil (Assessment Test)}} \]
IDEB Projections

IDEB Projections - States Systems - ISCED 1

Inequality reduction

Ideb UF 1 = 6,9
Ideb Brasil = 6,0
Ideb UF 2 = 4,8
IDEB: low stakes accountability

- There are no punishment or rewards;

- There is public recognition: best and worse schools have a lot of publicity;

- The municipalities with the worse IDEBs are considered priorities in federal policies:
  - All municipalities had to design a Plan of Articulated Actions since 2005: these ones received technical help from the Ministry of Education;
  - They are the first where some policies are implemented;

- Had an important influence over state and municipal policies.
IDEB – 2007 and 2009
Elementary education – municipal systems

Brazil 2007

Brazil 2009

Até 3,7
De 3,8 a 5,9
6,0 ou mais
Sem Ideb
MINAS GERAIS STATE
Minas Gerais State School System

- 3.808 schools;
- 270 thousand teachers;
- Students: 2 millions, 130 thousand at regular education (primary and secondary);
- Budget: US$ 3 billions, 465 millions;
- Investment per student (2010): US$ 1,230,00 / year
- Highest IDEB score for the first years of primary school;
- Third highest IDEB scores for the last years of primary school and for secondary school.
CBC: Express the key aspects of each discipline, which have necessarily be taught and learned by the students. At the same time, indicate the skills and competence that students have to acquire and develop.
In-service Education

Primary School
- “PRO-CIÊNCIA” - Trainingship for teachers in Sciences and Mathematics.
  - Program for teachers of the first years of Primary School, who are not used (cause of their generalist education) to work with sciences and maths contents in class. The program intend to train the teacher to do more attractive and fruitful classes, through using new methodologies, new resources and work with everyday life themes.

- “PIP” – Program of Pedagogical Intervention
  - The program is dedicated to enhance the performance of the schools with the worst state results. A group of specialist in each subjects goes to these schools, propose a plan of intervention and trains the teachers and school specialists to improve their pedagogical practices. The development of the plan and the increasing in school results are constantly monitored.

High School
- “GDP” – Groups of Professional Development
  - GDP is a program that creates, inside the schools, study groups to estilamate the self-learning process among the participants. The groups are coordinated by a specialist at the field of knowledge (there’s 6 different fields currently), who suggests lectures and activities that can be done in class. All the meetings are online.
Math Teacher’s Characteristics

- 35,146 math teachers;
  - About 20% are temporary;
  - 88% are women;
  - 87.9% have an undergraduate (at least);
  - 34.5% have a postgraduate;
  - Average age of 42.75 years old;
## Math Teacher’s Characteristics

### Permanent Teachers by year of entrance

<table>
<thead>
<tr>
<th>Year of entrance</th>
<th>Percent (%)</th>
<th>Cumulate (%)</th>
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</thead>
<tbody>
<tr>
<td>from 2006 to 2011</td>
<td>4.30</td>
<td>4.30</td>
</tr>
<tr>
<td>2001 to 2005</td>
<td>44.54</td>
<td>48.84</td>
</tr>
<tr>
<td>1996 to 2000</td>
<td>7.11</td>
<td>55.95</td>
</tr>
<tr>
<td>1995 or later</td>
<td>44.05</td>
<td>100.00</td>
</tr>
<tr>
<td>Sum</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Regional Tests

- SIMAVE – System of Schoolar Evaluation of the State of Minas Gerais:
  - PROALFA: Evaluates the literacy level of the students at the 3rd year of Primary School
  - PROEB: Evaluate the performance of students at 5th, 9th and 12th grade on Portuguese Language and Mathematics
  - PAAE: Evaluate the performance of the students on Portuguese and Mathematics at the Beginning and at the End of the year. It’s applied, currently, for the 1st year of High School (10th grade). The teachers have to answer the questions also.

- The teachers receive a bonus salary (a maximum of 1 month salary per year) according to their school performance at PROALFA and PROEB
Regional Tests

Students at the recommended learning level in Mathematics - Minas Gerais, PROEB (2006-2010)

Percent (%)

Year

2005 2006 2007 2008 2009 2010 2011

Elementary School

Middle School

High School
Regional Tests

Correct answers at the PAAE exam in Mathematics - 1st grade of High School, Minas Gerais 2010

- Teachers: 87.2% at the beginning, 87.4% at the end.
- Students: 33.2% at the beginning, 39.4% at the end.
RIO DE JANEIRO STATE
## Regional context

### Recent

- Absence of norms (directions, evaluations)
- Absence of admission procedures to select the school and regional staff
- Absence of intelligence (data about schools, teachers and students)
- Absence of organization (recruitment, formation, search for results).
- Lack of teachers

### In progress

- Curriculum and evaluations
- Intelligence, studies and planning
- Recruitment, formation and incentives
- Admission procedures to all positions
- Focus on management, targets and results (with special attention to 150 weakest schools)

### Statistics

- **1,137 Million students**
- **9211 Math teachers**
- **350 teachers**
Teachers capacitation

- Teachers school to develop best practices (in project)
- Partnership with Universities for specializations (Plataforma Freire – national program)
- Partnership with Science and Technology State Department to improve Math teaching according to the curriculum standards (distance learning)

Incentives

- Pay for performance (up to 3 salaries, according to targets defined for each school and level).
- Incentive for training (corporate card and special aid)
- Additional per qualification

2000 places available. Priority to schools with worst results.
Curriculum reform

2006: reform with general orientations (made with the supervision of a University with the participation of teachers community)

2009: dividing orientations by year and semester

2010: developing specific items (from 6th year to final year)

2011: applying the curriculum

2012: developing and applying the curriculum from 1st year to 5th year
**Curriculum references**

- Federal norms (LDB, national curricular directives)
  - Regional curricular directions (2006)
- Main evaluation references (Saerj, Saeb, Prova Brasil, Enem)
  - Curriculum of municipal schools

**Notice:** The curriculum was elaborated by six teachers, with the supervision of a University Professor.

**Difficulties in applying the curriculum**

- Textbooks
  - Students heterogeneity
- Hours of class (part time)
Regional evaluations

National test (Prova Brasil) every two years and regional test every year (Saerj): to measure results

Regional test every two months ("Saerjinho"): a thermometer to monitor the work in progress

**Notice:** evaluations (measuring results) does not correspond precisely to the curriculum references, although they have to do with it.
Students results in 2008, 2009 and 2010 (SAERJ)


Metropolitan area doing bad

Interior, rural areas doing good
Rio de Janeiro Municipality
Rio de Janeiro Municipality

System: 1063 schools located in 10 regional centers.

685,300 students

- 431,100 1st – 5th grade
- 254,200 6th – 9th grade

Number of graduated Math teachers: 2,139
- admitted since 2009: 558

Primary teachers admitted since 2009: 3,187
The city of Rio de Janeiro position in the National Assessment

### 5th grade

<table>
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<th>Observed IDEB</th>
<th>Aims projected</th>
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<tbody>
<tr>
<td>4.7</td>
<td>5.1</td>
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</table>

### 9th grade

<table>
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<th>Observed IDEB</th>
<th>Aims projected</th>
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<tr>
<td>4.3</td>
<td>3.6</td>
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</table>
The case of Rio de Janeiro municipality

Actions (since 2009):

- An unique curriculum to cover the diversity of the students population (Orientações Curriculares);

- Booklets for students and teachers, produced by the team fixed at the central office, helping students to construct the knowledge (4 per schoolyear: 36 in one year);
3. No terreno representado abaixo, Jair deverá determinar uma superfície maior possível para ser gramada. A única exigência é que a superfície seja quadrangular, com medidas de lados iguais.

![Diagrama de um terreno quadrado de 15m x 8m]

Essa superfície deve ter a forma de um quadrado ou de um losango?

Vamos auxiliar o Jair.

a) Se a superfície gramada for quadrada, seu lado deve medir 8m.

b) Calculando a área dessa região: \(8^2 = 64\).

c) A área da região quadrada seria 64m\(^2\).

d) Se a superfície gramada tiver a forma de um losango, sua diagonal maior deve medir 15m e a menor deve medir 8m.

e) Calculando a área dessa região: \(\frac{15 \times 8}{2} = \frac{120}{2} = 60\).

f) A área da região em forma de losango seria 60m\(^2\).

A região a ser gramada deve ter a forma de um quadrado.

E se o terreno tivesse as dimensões abaixo, qual deveria ser a forma da região a ser gramada nessas condições?

Área da superfície quadrada é 36m\(^2\).
Área da superfície em forma de losango é 45m\(^2\).
Nesse caso a superfície a ser gramada deve ter a forma de um losango.
Cristina está muito preocupada. Ela esqueceu de pagar a taxa do condomínio. Resolveu, então, ligar para seu amigo Cláudio.

O vencimento foi no dia 15 e hoje é dia 19.

Calma, Cristina! Leia com atenção o boleto de pagamento e me ligue.

O valor da taxa é R$ 180,00. Por cada dia de atraso vou pagar 1% do valor da taxa.

Após o vencimento, cobrar juros de 1% do valor da taxa por dia de atraso.

Para calcular o valor do juro diário, Cristina deverá encontrar 1% de 180 reais.
Actions...

- Educopedia: on-line interactive lessons using videos, computers, internet, games, and all kinds of materials
Atividade 1


Vamos começar a conhecê-los
Clique na figura abaixo para acessar.

Actions...

- Regular tests applied to all the students, from 1st to 9th grade;

- Simulated tests, preparing students to the national and state assessments: Prova Rio e Prova Brasil;

- Specific actions in schools needing to improve: full-time teachers and double journey for students
Teacher induction program for beginning Mathematics teachers

A joint program of CAPES (Education Ministry) and Pedro II School (a federal traditional school in Rio de Janeiro) is to be launched next August:

Novice Maths teachers (with no more than three years of experience) teaching in public schools of Rio will receive a scholarship and support from the school in their teaching practice.
Incentivating teachers improvement

- Partnership with Projeto Fundão from Universidade Federal do Rio de Janeiro to offer teacher training courses for teachers of all levels and to supervise the production of materials and tests;
- Regular workshops for teachers;
- All teachers got laptop computers;
- Support teachers to attend conferences and meetings on Mathematics Education.
Thanks!

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